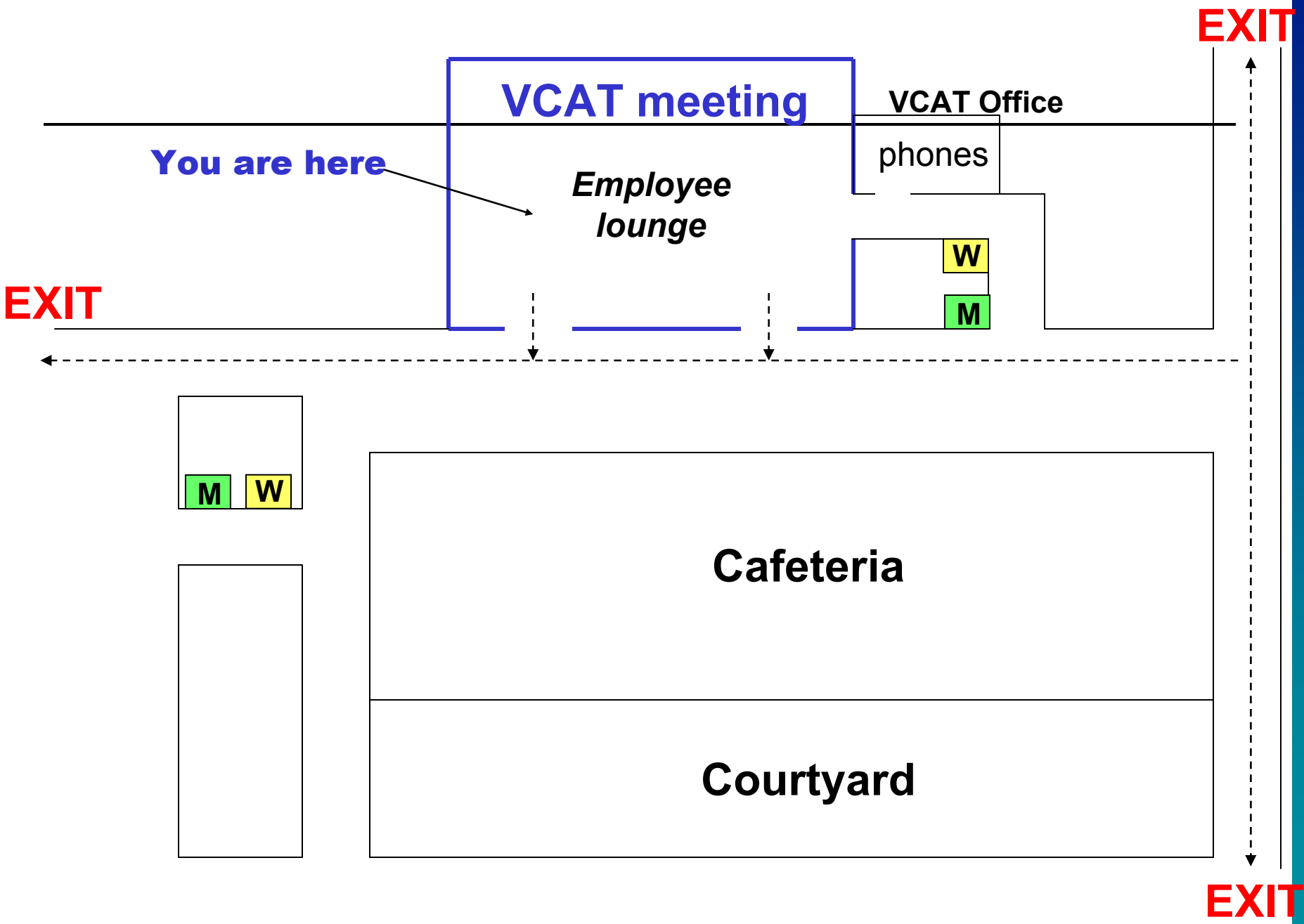
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NIST Update

William Jeffrey
Director

Visiting Committee on Advanced Technology
June 13, 2006

NIST
National Institute of Standards and Technology
Technology Administration
U.S. Department of Commerce

NIST Update

- New VCAT Member
- Outreach
- Staff Changes & Recognition
- Highlights
- Meeting Agenda

New VCAT Member

PAUL A. FLEURY

Dean of Engineering and Frederick W. Beinecke
Professor of Engineering and of Applied Physics
Yale University

Recent NIST Outreach…

- Industry: Intel, Sun Microsystems, Nat. Assoc. Manufacturers, Automotive Industry Action Group
- Government: OSTP, NASA, Bureau of Industry and Security, NOAA, …
- Universities: U. of MD, George Mason, U. of AL, U. of TX, U. of WI, Rose-Hulman, …
- Non-Profit: e.g., Albany Nanotech., Council for Chem. Res., ANSI, UL

- NIST Director and NIST staff provided 6 Congressional testimonies during the last three months
- Secretary Gutierrez announced the collaborative Center for Nanoscale Science and Technology
- NIST and ORNL dedicated the Nuclear Medicine Calibration Laboratory at Oak Ridge National Laboratory

DoC and NIST Staff Changes

Robert Cresanti, DoC Under Secretary for Technology

Cita Furlani, Director of Information Technology Laboratory

DoC and NIST Staff Changes

Mirta-Marie Keys, Director of Civil Rights and Diversity Division

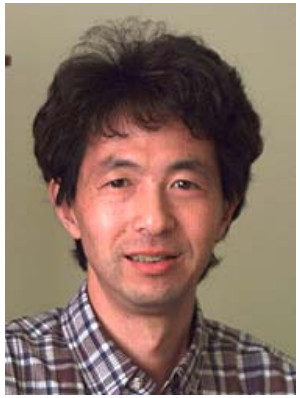
David Karmol, Mission to Iraqi Central Organization for Standardization and Quality Control

Staff Recognition

2006 ARTHUR S. FLEMMING AWARDS
RECOGNIZING OUTSTANDING FEDERAL GOVERNMENT SERVICE

Bradley K. Alpert, computer scientist
His contributions have led to advances in wave propagation, antenna design, microcircuits and transducer design, and climate modeling.

Carl J. Williams, **physicist**
His work on ultracold quantum mechanics is laying the foundation for future quantum computing.



Yoshihiro Ohno, physicist
Recognized for his innovative research and international leadership in the optical sciences of photometry and colorimetry.

Staff Recognition

Top Seismic Program of the 20th Century

awarded to

National Earthquake Hazards Reduction Program

Applied Technology Council

nehrp

NIST National Institute of Standards and Technology

FEMA

NSF

USGS science for a changing world

Staff Recognition

New Society Fellows

Manny Knill
APS

Eric Shirley
APS

Dave Seiler
IEEE

Steve Semancik
APS

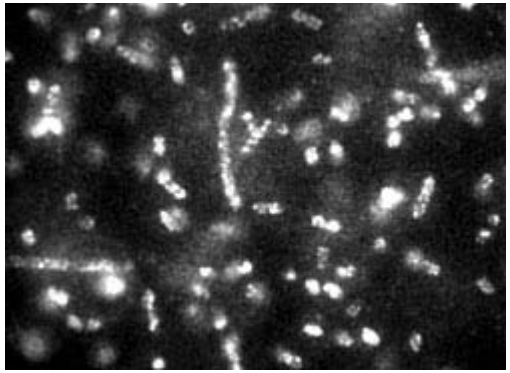
Steve Cundiff
APS

Eite Tiesinga
APS

Technical Highlights … *Measurement Science*

Method for Rapid Identification of Bacteria

- Traditional methods for detecting and identifying bacteria require culturing for day or more to obtain large quantities
- NIST scientists, in collaboration with NCI scientists, have selectively attached quantum dots to bacteria

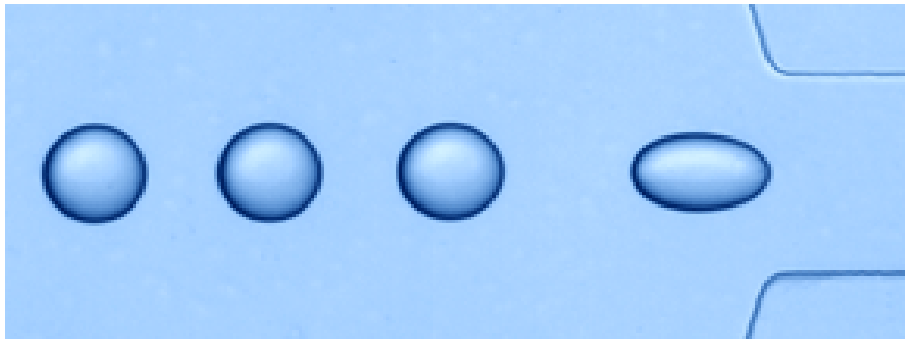


NCI/NIST

Fluorescence micrograph showing quantum dots attached to bacterial cells

- The quantum dots radiate light of a specific color very efficiently and can be detected optically revealing the presence of as few as 10 bacteria cells per milliliter
- This technique is a step toward development of handheld device for accelerated identification of biological weapons and virulent strains of bacteria

Technical Highlights … *Measurement Science*



S. Hudson, NIST

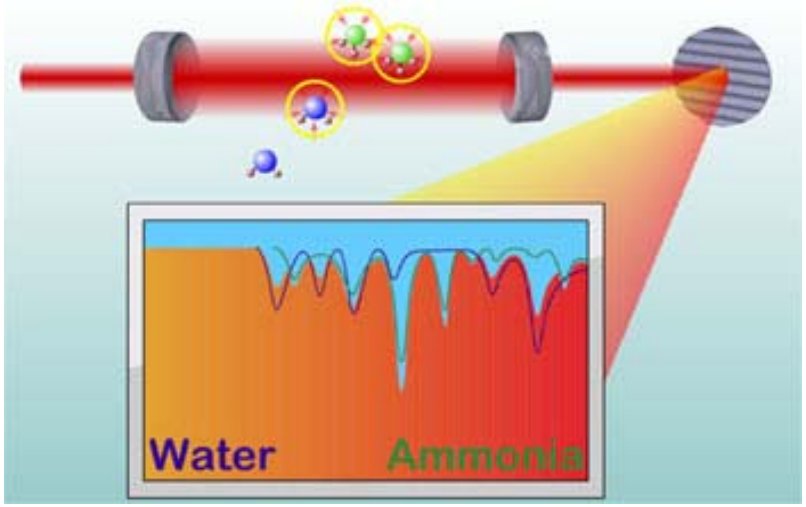
Microfluidic Device for Analyzing Mixtures

- Tension on surface of liquid droplet determines ability to mix with other fluids
- NIST-developed chip-sized device measures interfacial tension as droplets flow through a 50 micron orifice
- 1-second measurement analyzes miscibility of new formulations of liquid mixtures
- This device will speed new product development for fluid mixtures like detergents, cosmetics, paints, etc.

Technical Highlights … *Measurement Science*

Optical Frequency Comb for Sensitive Chemical Analysis

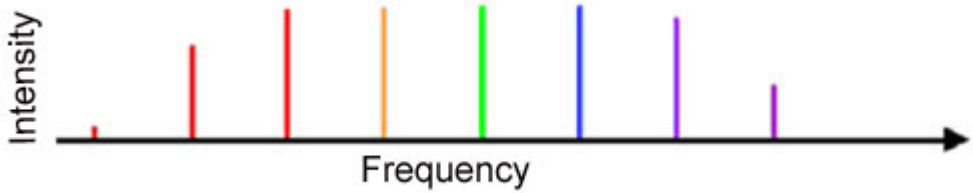
- NIST scientists have applied the optical frequency comb, subject of the 2005 Nobel Prize, to achieve sensitive detection and identification of molecules



Jeffrey Fal, JILA

- Well-defined frequencies of the comb distributed across a wide spectral range make comb a unique tool that can be applied to a number of measurement problems

- Applicable to chemical analysis, environmental monitoring, screening for explosives or bio-chemical agents, and medical testing



Technical Highlights … *Biometrics*

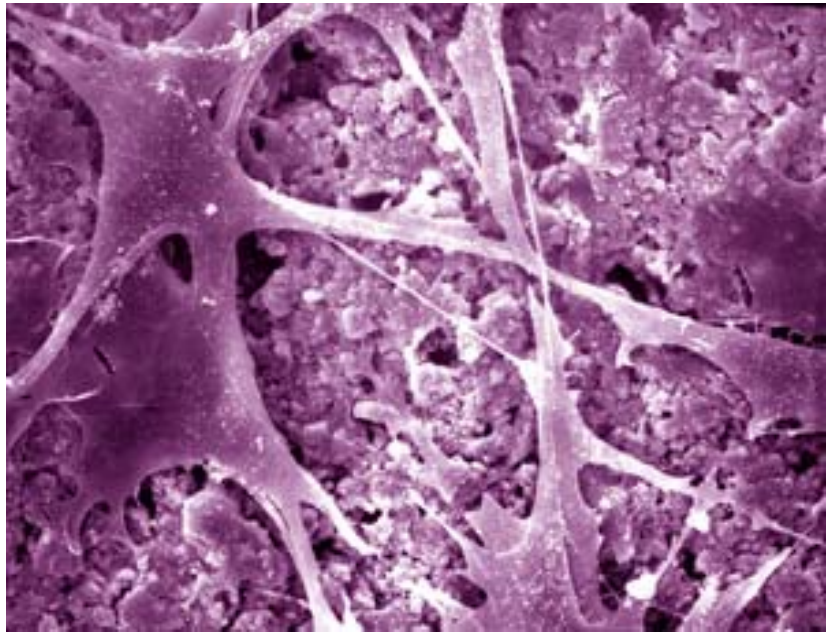
Mathematical Representations of Fingerprints are Accurate Identifiers

- Mathematical representations of a fingerprint can be stored and shared electronically much more easily than full fingerprint image
- NIST measured the performance of a new standard for exchanging fingerprint data between instruments and software of different manufacturers
- Mathematical representations of two index fingers provided accurate identification 98% of the time
- The new standard will allow for more widespread and more rapid use of fingerprint identification for security screening

Technical Highlights … *Bioscience*

Bioactive Implant for Bone Grafts

- NIST and American Dental Association Foundation researchers developed a new implant technology to improve bone repair
- The implant consists of a mixture of cement, bone minerals, and natural polymers seeded with a patient's own bone cells
- After implantation, the polymer dissolves leaving room for the bone cells to grow on the mineral scaffolding
- This technology will benefit patients requiring reconstruction of facial bones, skull, or jaw

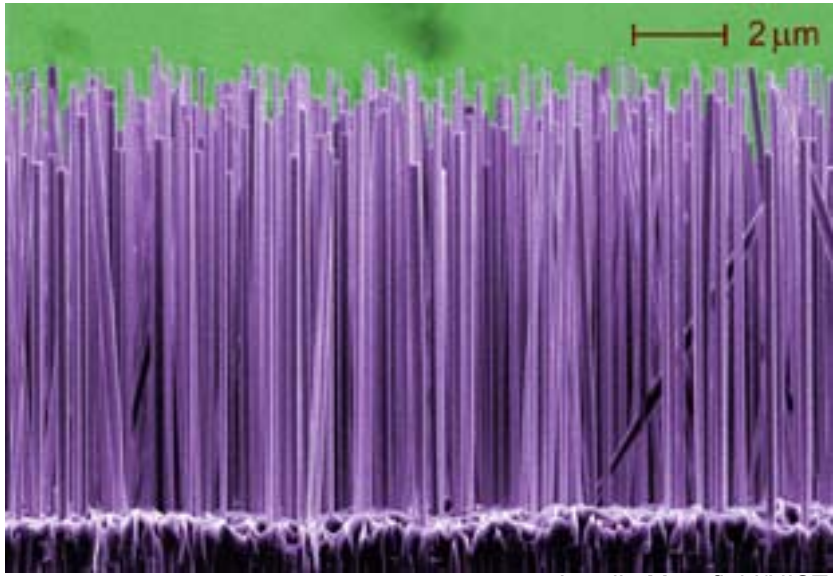


X. Hu/American Dental Association

Technical Highlights … *Nanoscale Technology*

Light from Nano-Wires

- Semiconductor nano-wires grown by NIST researchers emit light when excited by a laser or electric current
- This presents the possibility for nano-wire lasers or light-emitting diodes with special properties



Lorelle Mansfield/NIST

- Possible applications include:

  - incorporation into the “lab on a chip” concept for identifying chemicals and biological agents,

  - scanning probe for imaging nano-objects,

  - manufacturing micro-electro-mechanical devices

Standards Highlights … *International Standards*

NIST Facilitates New Standard for Trade with EU

- NIST worked with U.S. industry representatives to develop a new standard for declaring and tracking hazardous materials in electronics exported to the EU
- The new standard is motivated by new EU regulations governing hazardous materials in electronic goods such as household appliances, telecommunications and lighting equipment, tools, toys, and computers
- The standard is critical in simplifying efforts by U.S. companies to comply with the new regulations

Malcolm Baldrige National Quality Program

- Vice President Cheney and Secretary Gutierrez presented Baldrige National Quality Awards to six organizations in April ceremony

Ron Bell/DOC

- 2006 Quest For Excellence Conference to share recipients' successful strategies

Hollings Manufacturing Extension Partnership

- Next Generation MEP is focused upon enabling U.S-based manufacturers to continue to remain globally competitive by exploiting technologies to meet the needs of their markets. The success of this effort hinges upon integrating three key components:
  - Establish methodologies that help clients create and implement innovation into their products, processes, services and business models
  - Develop partnerships at the national, state and local level with technology and workforce development organizations in order to provide solutions and resources
  - Support technology deployment in local clients
- $4.5 million in grants awarded to AL, FL, LA, MS, and TX MEP Centers to assist Gulf Coast manufacturers in recovery from last year's hurricanes

Outline of VCAT Agenda
June 13-14, 2006

- **NIST Update**
- **Safety at NIST**
- **Vision for the Center for Nanoscale Science and Technology**
- **USMS Update**
- **NIST Planning Process Overview and Future Directions**
  - Director's Office
- **Laboratory Tours**
  - Nanomagnetics
  - Super-resolution Microscopy
  - Building for Environmental and Economic Sustainability
- **Hurricanes Katrina and Rita: NIST Reconnaissance**
- **VCAT Panel: How to Maximize NIST Impact on U.S. Innovation**